

changing social growths is best to be found in the philosophy of the individual treatment of crime-cause, and its appropriate remedies.

That such a conclusion will be reached, as penology is studied, is most likely. If so, it will be the conviction of the judgment which comes from the demonstration of the principles which, since 1790, in this city have been taught as the science of convict punishment. This advance will be slow. It must be remembered that Beccaria in his essay on "Crimes and Punishment" in 1764; Filangieri in his "Science of Legislation" in 1780 and Montesquieu in his "Spirit of the Laws," 1748, were among the first to invite attention to penal jurisprudence. A century elapsed before practical advantages testified to the effect produced from this discussion of the subject. The Pennsylvania prison system rests its claim for recognition and adoption on the suggestions of philosophy, and the teaching of experience, confirmed by half a century of trial. It must teach, and wait.

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*Notes on the Stromateidæ. By Theodore Gill.*

(Read before the American Philosophical Society, July 18th, 1884.)

The grave errors into which Dr. Günther seems to have fallen in the treatment of certain forms of this family furnish my excuse for the present communication. Dr. Günther has reiterated, without change, opinions enunciated twenty years ago, and he still separates widely forms of one of the subfamilies of this family, dispersing representatives thereof among four of his "families" and associating them in several cases with forms with which they have no affinity. Following Dr. Günther in the first instance Dr. Day has also misunderstood one of the types in question, and Dr. Lütken has likewise been deceived as to the relationships of the same form.

The family, as here understood, is co-equal with the Stromateidæ of Dr. Günther, with the addition of several types widely scattered by that gentleman. It embraces in fact, (1) the Stromateidæ recognized as such by Dr. Günther, (2) the genus *Pammelas* of his *Carangidæ*, (3) the species *Psenes anomalus* of his *Nomeidæ*, and (4) the genus *Schedophilus* of his *Coryphanidæ*. There are two quite distinct types in the group thus constituted, (1) one represented by *Stromateus* and its allies, and (2) the other by *Centrolophus* and relatives. These are distinguished by differences in the development of the vertebræ, the former having 14-15 abdominal and 17-21 caudal vertebræ, and the latter 11 abdominal and 14 caudal vertebræ; these differences are supplemented by variations in the degree of complexity of the peculiar appendages representing and homologous with the gill-rakers of ordinary fishes, developed from the last branchial arch, and extending into the œsophagus. It is quite possible, therefore, that the two types, now retained as sub-families under the old names *Stroma-*

*teinæ* and *Centrolophinae*, should be distinguished as families. It is only the want of sufficient data respecting the several genera that delays such a recognition at the present time.

The *Centrolophinae* appear to be the most generalized type, the ventrals being fully developed and retained in all stages, the dorsal and anal spines normally developed, and the preoperculum in some always retaining the spines characteristic of the youth of the Scombroid fishes, while the *Stromateinæ* contrast more or less in all these several features, and also have more specialized gill-rakers or processes.

A summary of the known types of the family will give the means of better appreciating the relations of the forms to be specially considered.

#### Family STROMATEIDÆ.

##### *Synonymy.*

- > *Stromatini*, *Rafinesque*, *Indice d'Ittiolog. Siciliana*, p. 39, 1810.
- × *Fiatolides*, *Risso*, *Hist. Nat. de l'Europe Mérid.*, t. 3, pp. 107, 287, 1826.
- × *Stromateidæ*, *Adams*, *Manual Nat. Hist.*, p. 98, 1854.
- > *Stomateidæ*, *Günther*, *Archiv für Naturg.*, 28. Jahrg., B. 1, p. 59, 1862.
- =====, *Gill*, *Proc. Acad. Nat. Sci. Phila.* [v. 14], p. 126, 1862.
- (Indicated but not named or defined.)
- > *Stromatei*, *Fitzinger*, *Sitzungsber. K. Akad. der Wissench. (Wien)*, B. 67, 1. Abth., p. 32, 1873.
- > *Stromateidæ*, *Günther*, *Int. to Study of Fishes*, p. 452, 1880.
- ===== *Stromateidæ*, *Jordan and Gilbert*, *Syn. Fishes N. Am.*, p. 449, 1882.
- Scombroides* gen., *Cuvier et al.*
- Psettoidei* gen., *Bleeker*.
- Coryphænoidei* gen., *Bleeker*.
- Coryphænidæ* gen., *Günther*.
- Carangidæ* gen., *Günther*.
- Nomeidæ* sp., *Günther*.

Scombroidea with an elongated dorsal whose foremost rays only are more or less spiniform and the gill-rakers of the upper segment of the last branchial arch enlarged and dentigerous or sacciform, and projecting backwards into the œsophagus.\*

*Body* generally compressed, with the form regularly ovate or sub-orbicular, but sometimes more or less oblong or elongate, highest near the scapular region, and with the caudal peduncle suddenly constricted and slender.

*Anus* in the anterior half of the body.

*Scales* small, cycloid and smooth.

*Lateral line* nearly concurrent with the dorsal outline.

*Head* compressed, generally higher than long, with the profile more or less decurved in proportion to the height, and with the snout more or less convex. Eyes submedian or anterior.

\* "The œsophagus is armed with numerous bony, barbed teeth," *Günther*, *Cat. Fishes B. M.*, v. 2, p. 307.

*Suborbital bones* small.

*Opercular bones* normally developed

*Nostrils* double, in front of each eye.

*Mouth* terminal, moderate or small, with the cleft lateral and little oblique.

*Upper jaw* in some (Stromateinæ) not protractile, in others (Centrolophinae) protractile.

*Teeth* small and pointed, absent from the palate.

*Branchial apertures* variable.

*Branchiostegal rays* variable (5 to 7).

*Dorsal fin* commencing at the nape or behind the bases of the pectorals, elongated, and with few small or rudimentary and often modified spines in front; the soft rays branched.

*Anal fin* commencing behind the anus and coterminous with the dorsal, to which it is similar in form and structure, but with fewer spines in front.

*Caudal fin* more or less emarginated or forked.

*Pectoral fins* inserted rather high on the sides, well developed and pointed or rounded.

*Ventral fins* thoracic or jugular when present, often absent (obsolete in the old, but developed in the young of some species).

*Branchiæ* 4, with a cleft behind the last.

*Pseudobranchiæ* developed.

The *pharyngeal bones* beneath are separated.

The *stomach* is cœcal, and the *pyloric appendages* in some numerous or dendritic, and in others developed in moderate number.

#### Subfamily CENTROLOPHINÆ.

##### *Synonymy.*

=Centrolophinae, *Gill*, Cat. Fishes E. Coast N. Am., p. 34 (not defined), 1861.

=Centrolophinae, *Gill*, Proc. Acad. Nat. Sci. Phila., p. 127 (not defined, but genera enumerated), 1862.

=Centrolophinae, *Jordan and Gilbert*, Syn. Fishes N. Am., p. 450, 1882.

*Coryphæninia* gen., *Bonaparte*, 1831, 1838, 1840, 1846, 1850.

*Stromateina* gen., *Günther*.

*Coryphænina* gen., *Günther*.

*Carangina* gen., *Günther*.

*Nomeina* sp., *Günther*.

Stromateidæ with complex elongate gill-rakers, extending backwards from the epibranchials of the last branchial arch, 11 abdominal and 14 caudal vertebræ, protractile premaxillaries, and normally developed ventral fins (1.5) persistent through life.

Although the constituents of this subfamily have been widely scattered, and still continue to be, their relations were appreciated and contended

for more than a score of years ago. One of the genera has had a singular history, which may be detailed more at length hereafter. Suffice it now to state that one species was originally described as a *Centrolophus*, and subsequently differentiated as a peculiar generic type under the names *Leirus* and *Mopus*, while another closely related was originally introduced as a *Coryphæna*, again as a *Trachynotus*, and afterwards distinguished as a new genus *Palinurus*, near *Trachynotus*. The name *Palinurichthys*, was substituted for it Nov., 1859, by Bleeker and about the same time,\* in Jan., 1860 (Proc. Acad. Nat. Sci., Phila., 1860, p. 20), Gill also independently proposed the name *Palinurichthys* as a substitute for *Palinurus*. In the "Catalogue of Fishes of the Eastern Coast of North America," published in Feb., 1861 (p. 34), it was referred to the sub-family Centrolophinae. In critical remarks on Dr. Günther's composition of the Scombroid families ("On the Limits and Arrangement of the Family of Scombroids"), published in March, 1862 (Proc. Acad. Nat. Sci. Phila., 1862, p. 127), it was claimed that "nearly allied to the preceding [Stromateinae] are the Centrolophinae, with the genera *Centrolophus* Lac., *Leirus* Lowe, and *Palinurichthys* Gill, Blkr. (=Pammelas Gthr.). Closely connected to the Centrolophinae are the genera *Schedophilus* Cocco and *Hoplocoryphus* Gill (type *Schedophilus maculatus* Gthr.)." A few lines further it was again remarked that among the forms that should be withdrawn from the Carangidae was "*Pammelas* Gthr., which is nearly allied to *Centrolophus*." Finally, in Gill's new "Catalogue of the Fishes of the Eastern Coast of North America" (1872, p. 9), *Palinurichthys* was enumerated under the family "Stromateidae" and the subfamily "Centrolophinae." Notwithstanding these explicit statements the genus has been retained by Dr. Günther and Dr. Day next to *Trachynotus*, with which it has no affinity whatever. Its anatomy conclusively shows that the view, originally formed by the author from a consideration of its exterior, is perfectly correct. It has the number of vertebræ, epibranchial processes, &c., of *Centrolophus*, and in fact is scarcely, if at all, distinguishable from *C. ovalis* of European authors.

## CENTROLOPHUS.

*Synonymy.*

- =*Centrolophus*, *Lacépède*, Hist. Nat. des Poissons, t. 4, p. 441, 1802.
- <*Centrolophus*, *Cuvier*, Règne Animal, 2 ed., t. 2, p. 216, 1829.
- <*Acentrolophus*, *Nardo*, Prodr. Ichthyol. Adriat., sp.
- <*Centrolophus*, *Cuvier and Valenciennes*, Hist. Nat. des Poissons, t. 9, p. 330, 1833.
- =*Pompilus*, *Lowe*, Proc. Zool. Soc. London, 1839, p. 81.
- Coryphæna* sp., *Linnaeus*, etc.
- Perca* sp., *Gmelin*.
- Holocentrus* sp., *Lacépède*.

\*The paper in the Proc. Acad. was probably published earlier than Dr. Bleeker's, but happily the question is immaterial.

Centrolophinae with an elongated body, and very slender spines, scarcely distinguishable externally from the succeeding rays.

Type *C. pompilus* = *Coryphaena pompilus* Linn.

#### SCHEDOPHILUS.

##### *Synonymy.*

=Schedophilus, *Cocco*, Giorn. Innom. Messin., anno 3, No. 57, p. 57 (fide Bon.) 1834?

=Schedophilus, *Bonaparte*, Fauna Italica, iv, Pesci, fol. 127 (marked 132), 1839.

Centrolophus sp., *Cocco*.

Crius sp., *Valenciennes*.

Centrolophinae with an oval contour, about four short, stout spines constituting the foremost part of the dorsal, and a declivous or slightly protuberant snout.

*S. medusophagus* = *Centrolophus medusophagus* *Cocco*.

The generic characters of this type, if distinct, have not yet been satisfactorily contrasted with those of *Leirus*. There is a singular discrepancy between the several figures of the types, most of which can, however, be satisfactorily accounted for.

#### LEIRUS.

##### *Synonymy.*

??Lepterus, *Rafinesque*, Caratteri di alcuni n. gen. e n. sp. Animali e Piante della Sicilia, p. 52, pl. 10 (D. ii, 30; A. i, 14; P. 20; V. i, 5), 1810.

??Lepipterus, *Rafinesque*, Indice d'Ittiologia Siciliana, p. 16, 1810.

=Leirus, *Lowe*, Proc. Comm. Zool. Soc., London, pt. 1, p. 143; Trans. Cambridge Phil. Soc., v. 6, p. 199, pl. 5, 1833.

=Mupus, *Cocco*, Giorn. Innom. Messin. ann. —, p. —.

<Crius, *Valenciennes*, Hist. Nat. des Iles Canaries, par Webb and Bertbe-  
lot, t. 2, part 2, Poissons, p. 45, 1836-44.

=Palinurus, *Dekay*, Zoology of New York, pt. 4, p. 118, 1842.

=Mupus (*Cocco*), *Bonaparte*, Cat. Met. dei Pesci Europei, p. 77 (name only), 1846.

=Palinurichthys, *Bleeker*, Enum. sp. Pisc. Archipel. Ind., p. 22, Nov., 1859.

=Palinurichthys, *Gill*, Proc. Acad. Nat. Sci. Phila. [v. 12], p. 20, Jan., 1860.

=Pammelas, *Günther*, Cat. Fishes in Brit. Mus., v. 2, p. 485, 1860.

=Leirus, *Jordan and Gilbert*, Syn. Fishes N. Am., p. 452, 1882.

Coryphaena sp., *Mitchill*.

Trachinotus sp., *Storer*.

Centrolophus sp., *Cuv. and Val.*, *Günther*, etc.

Pompilus sp., *Lowe*.

Centrolophinae with an oval contour, six to eight short stout spines constituting the foremost part of the dorsal, and a protuberant snout.

Type *L. ovalis* = *Centrolophus ovalis*, C. V.

It is possible, perhaps probable, that the fish from which the following very unsatisfactory description was taken by Rafinesque was a specimen of the typical species of this genus.

“XXXIII. G. LEPTERUS.—Capo troncato senza squame, dei denti alla mascella, inferiore sola nente, opercolo doppio, l'esterne spinoso, l'interno dentelato, base dell'ale dorsale, anale e caudale [p. 53] ricoperte di squame, una sola ala dorsale con pochi raggi spinosi.—Oss. Il Carattere che distingue particolarmente questo genere dall' *Holocentrus* si è quello delle sue ale squamose.

“142. Sp. LEPTERUS FETULA.—Nero al disopra, bianco al disotto, linea laterale curva nel mezzo, coda forcata, ala dorsale con 32 raggi di cui 2 spinosi, l'ala anale con 15 di cui 1 è spinoso.—Oss. Porta il nome di *Fetula*, è raro e poco stimato, ha alcuni piccoli denti acuti alla parte anteriore della mascella inferiore, l'iride bianca, le ale pettorali con 20 raggi e le toraciche con 6 di cui il primo è spinoso; la sua lunghezza è di circa mezzo piede.”

#### Subfamily STROMATEINÆ.

##### *Synonymy.*

- × *Stromatia*, *Rafinesque*, *Analyse de la Nature*, p. —, 1815.
- < *Stromateini*, *Bonaparte*, *Iconografia della Fauna, Italica*, t. 3, *Pesci*, fol. 125 (contains *Stromateus*, *Peprilus*, *Luvarus* and *Kurtus*), 1834.
- < *Stromatinæ*, *Swainson*, *Nat. Hist. and Class. Fishes, etc.*, v. 2, pp. 177, 253, 1839. (Includes *Sesirinus*, *Stromateus*, *Peprilus*, *Kurtus* and *Keris*.)
- < *Stromateini*, *Bonaparte*, *Nuovi Annali delle Sci. Nat.*, t. 2, p. 133, 1838; t. 4, p. 275, 1840.
- < *Stromateina*, *Günther*, *Cat. Fishes in Brit. Mus.*, v. 2, pp. 355, 397, 1860.
- = *Stromateinæ*, *Gill*, *Cat. Fishes E. Coast N. America*, p. 35, 1861.
- = *Stromateinæ*, *Gill*, *Proc. Acad. Nat. Sci. Phila.*, 1862, p. 126, 1862.
- = *Stromateinæ*, *Jordan and Gilbert*, *Syn. Fishes N. Am.*, p. 450, 1882.

*Stromateidæ* with 14–15 abdominal and 17–21 caudal vertebræ, saciform processes extending backwards from the hindmost branchial arch, non-protractile premaxillaries, and with the ventral fins generally early atrophied or lost, and absent in adult—rarely persistent.

Dr. Lütken recognizes two genera of *Stromateinæ*, viz. :

#### I. STROMATEUS.

*Stromateinæ* with ample branchial apertures.

In 1862 Gill proposed to subdivide this type into four genera or subgenera, viz. :

## 1. STROMATEUS.

*Synonymy.*

- <Stromateus, *Artedi*, Genera Piscium, p. 19, 1738.  
 <Stromateus, *Linnæus*, Systema Nature, ed. x, t. 1, p. 248, 1758; ed. xii, t. 1, p. 432, 1766.  
 ×Chrysostrome, *Lacépède*, Hist. Nat. des Poissons, t. 4, p. 698, 1802.  
 <Fiatola, *Cuvier*, Règne Animal [1<sup>re</sup> éd.], t. 2, p. 342, 1817. (Subgenus.)  
 <Stromateus, *Cuvier*, Règne Animal [2<sup>e</sup> éd.], t. 2, p. 212, 1829.  
 >Seserinus, *Cuvier*, Règne Animal [2<sup>e</sup> éd.], t. 2, p. 214, 1829.  
 <Stromateus, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 9, p. 372, 1833.  
 ×Stromateus, *Günther*, Cat. Fishes in Brit. Mus., v. 2, p. 397, 1860.  
 =Stromateus, *Gill*, Proc. Acad. Nat. Sci. Phila. [v. 14], p. 126, 1862.  
 Stromateus sp. *auct.*

Stromatei with uniform dorsum, little produced dorsal and anal fins, and without an obvious pelvic spine.

Type *S. fiatola* Linn.

## 2. PEPRILUS.

*Synonymy.*

- <Peprilus, *Cuvier*, Règne Animal [2<sup>e</sup> éd.], t. 2, p. 213, 1829.  
 <Rhombus, *Cuvier and Valenciennes*, Hist. Nat. des Poissons, t. 9, p. 401, 1833.  
 Chætodon sp., *Linn.*  
 Sternoptyx sp. *Bloch and Schneider.*  
 Stromateus sp., *Mitchill*, etc.

Stromatei with uniform dorsum, dorsal and anal fins extended vertically in front, and with a trenchant pelvic spine.

Type *P. alepidotus* = *P. longipinnis* Cuv., ex. Mitchill.

## 3. PORONOTUS.

*Synonymy.*

- =Poronotus, *Gill*, Cat. Fishes E. Coast N. Am., p. (not defined), 1861.  
 Stromateus sp., *Peck*, etc.  
 Peprilus sp., *Cuv.*  
 Rhombus sp., *Cuv. and Val.*

Stromatei with a row of vertical slits on each side of the back between the dorsal fin and lateral line, with little extended vertical fins, and with a trenchant pelvic spine.

Type *P. triacanthus* = *Strom. triacanthus* Peck.

## 4. APOLECTUS.

*Synonymy.*

- =Apolectus, *Cuv. and Val.* Hist. Nat. des Poissons, t. 9, p. 438, 1833.  
 Stromateus sp. *Bloch, Bleeker*, etc.

Stromatei with the lateral line keeled and shielded behind.

Type *A. niger* = *A. stromateus* *Cuv. and Val.*

## II. STROMATEOIDES.

Stromateinæ with restricted branchial apertures and without ventrals. There appears to be two types under this group, viz:—

## 1. STROMATEOIDES.

*Synonymy.*

- <Pamples, *Cuvier*, Règne Animal [2<sup>e</sup> ed.], t. 2, p. 212, 1829.  
 <Pampus, *Bonaparte*, Fauna Italica, iii, Pesci, fol. 125,\* 1834.  
 <Stromateoides, *Bleeker*, Bijdrage tot de kennis der makreelachtige Visschen van den Soenda-molukschen archipel, pp. 19–20, in Verhandl. bataav. Genootsch., v. 24, 1857.  
 <Stromateoides, *Lütken*, Vidensk Selsk. Skr. (5), Nat. og Mathem. Afd., v. 12, pp. 523, 602, 1880.

Stromateus sp., *Bloch*, *Günther*, etc.

Stromateoides with higher body, elevated vertical fins, and prominent and extended trenchant dorsal and anal spines.

Type *S. cinereus* Blkr., ex Bloch.

## 2. CHONDROPLITES.

*Synonymy.*

=Chondroplites, *Gill*, Proc. Acad. Nat. Sci. Phila. [v. 14], p. 126 (not defined), 1862.

Stromateus sp., *Euphrasen*, etc.

Stromateoides sp., *Bleeker*, *Lütken*.

Stromateoides with more oblong body, little elevated dorsal and anal fins, and concealed and subcartilaginous dorsal and anal spines.

Type *C. sinensis* = *Strom. sinensis*, *Euphrasen*.

## PSENOPISIS.

*Synonymy.*

=Psenopsis, *Gill*, Proc. Acad. Nat. Sci. Phila., 1862, p. 157, 1862.

Trachinotus sp., *Temminck and Schlegel*.

Psenes sp., *Bleeker*, *Günther*, *Lütken*.

Stromateinæ with persistent perfect ventrals (I, 5) and about 6 normal spines constituting the front of the dorsal fin.

Type *P. anomalus* = *Trachinotus anomalus*, T. and S.

The following genus may be mentioned in this connection because the *Leirus perciformis* as well as *Psenopsis anomalus* have been referred to it. Its affinities are uncertain.

\*“Diamo il nome di *Pampus* al secondo sottogenere in cui accogliamo quelle specie che non hanno pinne ventrali, e portano innanzi ai raggi delle dorsali e dell' anale parecchie spine terminate superiormente da una lamina tagliente.” *Bonaparte*.



## PSENES.

*Synonymy.*

*Psenes*, Cuvier and Valenciennes, Hist. Nat. des Poissons, t. 9, p. 259.

*Cubiceps*, Lowe, Proc. Zool. Soc. London, p. 82, 1843.

*Atimostoma*, Smith, Illust. Zool. S. Africa Fishes.

*Navarchus*, Filippi and Verany, Mem. Acad. Sci. Torin. (2), t. 18.

*Trachelocirrhus*, Doumet, Revue et Mag. de Zool., t. 15, p. 212, 425, etc., 1863.

*Cubiceps*, Günther, Cat. Fishes in Brit. Mus., v. 2, p. 388, 1860.

*Psenes*, Günther, Cat. Fishes in Brit. Mus., v. 2, p. 494, 1860.

These synonyms are given chiefly on the authority of Dr. Lütken (Vidensk. Selsk. Skr. (5), Nat. og Math. Afd., v. 12, pt. 6, pp. 513, 601).

The genus named *Schedophilopsis* by Dr. Steindachner\* under the supposition that it was nearly related to *Schedophilus*, has considerable superficial likeness to that genus, but apparently does not belong to the same family, and had received the slightly prior name *Icosteus*. It is the representative of a peculiar family, *Icosteidae*, in Jordan and Gilbert's Synopsis (p. 619).

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*Stated Meeting, Aug. 15, 1884.*

Present, 2 members.

An acceptance of membership was received from Dr. W. W. Keen, dated Philadelphia, July 19th, 1884.

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Donations to the Library were received from the Egyptian Institute; the Department of Mines, Melbourne; the Geological Survey of India; the Netherland Archives; the Royal Society of Northern Antiquaries; the Geological Society of Switz-

\**Schedophilopsis* = *Schedophilopsis Steindachner*, Anzeiger Math. Nat. cl R. Akad. Wissensch. zu Wien., 1881, p. 100 (*S. spinosus*), 1881.